on the day preceding or on the day of departure. Validating agents will be found at the city ticket offices and the main railway stations in San Francisco, Los Angeles and San Diego, at the Ferry Building, San Francisco, at the Southern Pacific Ferry Pier, Oakland, and at the Western Pacific Station, Oakland. A fee of fifty cents will be charged for the validation of each ticket.

APPOINTMENTS AT THE ROCKEFELLER INSTITUTE FOR MEDICAL RESEARCH

THE board of scientific directors of the Rockefeller Institute for Medical Research announces the following appointments and promotions:

Appointed an associate member:

Dr. James B. Murphy, hitherto an associate in the department of pathology and bacteriology.

The following have been made associates:

Dr. Carrol G. Bull (pathology and bacteriology).
Dr. Frederick S. Jones (pathology and bacteriology).
Dr. Clarence J. West (chemistry).
Dr. Michael Heidelberger (chemistry).
Dr. Frederick M. Allen (medicine).
Dr. Oswald T. Avery (bacteriology).
Miss Angelia M. Courtney (chemistry).
Dr. Eduard Uhlenhuth (experimental biology).

The following have been made assistants:

Dr. Harold K. Faber (pathology and bacteriology).
Mr. Chester H. Allen (chemistry).
Mr. James K. Senior (chemistry).
Mr. Glenn E. Cullen (chemistry).
Miss Mariam Vinograd (chemistry).

The following new appointments are announced:

Dr. R. Werner Marchand, assistant in department of animal pathology.
Dr. Carl Ten Broeck, associate in the department of animal pathology.
Dr. Herbert D. Taylor, assistant in pathology and bacteriology.
Dr. Oswald H. Robertson, assistant in pathology and bacteriology.
Mr. Ernest A. Wildman, fellow in chemistry.
Dr. Reginald Fitz, assistant in medicine and assistant resident physician.
Dr. Arthur L. Meyer, assistant in physiology and pharmacology.

SCIENTIFIC NOTES AND NEWS

SURGEON-GENERAL RUPERT BLUE, of the Public Health Service, was elected president of the American Medical Association at the recent San Francisco meeting.

LORD FISHER, former first sea lord of the British admiralty, has been appointed chairman of an "inventions board," which will assist the admiralty in coordinating and encouraging naval science.

DR. VIKTOR VON LANG, emeritus professor of physics at Vienna, has been elected president of the Vienna Academy of Sciences. The academy has elected as corresponding members Dr. Sven Hedin, the Swedish explorer, Dr. Max Planck, professor of mathematical physics at Berlin, and Dr. P. H. von Groth, professor of mineralogy at Munich.

AMHERST COLLEGE at its recent commencement conferred its doctorate of laws on Professor Benjamin K. Emerson, class of 1865, for forty-five years teacher of geology in Amherst College.

SHERBURNE WESLEY BURNHAM, for twenty years professor of practical astronomy in the University of Chicago and astronomer in the Yerkes Observatory, was given the honorary degree of doctor of science, at the commencement of Northwestern University.

IN conferring the Harvard doctorate of science on Dr. Frank Billings, President Lowell said: "Frank Billings, physician and citizen of Chicago; powerful in his profession and his community, who has inspired medical research, improved medical administration in his own state and promoted a higher grade of medical education throughout the land."

GENERAL WILHELM GRONER, head of the field railways of the German army, has been given honorary degrees by the University of Berlin and the Technical Institute of Stuttgart.

AMONG the fellows of the Royal Sanitary Institute recently elected are Dr. Julian Arce, director of the Department of Public Health of the Peruvian Republic, and Dr. Frank Fairchild Wesbrook, president of the University of British Columbia.

Dr. W. S. Thayer, of the Johns Hopkins Medical School, has been elected an overseer of Harvard University.

The title of professor of horticulture, emeritus, has been conferred by the University of California upon Edward J. Wickson, authority on the fruits, vegetables and flowers of California, a member of its agricultural faculty since 1880, and dean of the college of agriculture from 1909 to 1912.

Professor Charles Lee Crandall, of the college of civil engineering, Cornell University, has retired from the faculty after a service of forty-two years, and has been elected professor emeritus. Both the board of trustees and the university faculty have adopted resolutions with respect to his retirement.

Professor S. C. Lind has resigned the chair of general and physical chemistry in the University of Michigan. He has already been absent from the university for two years on leave as a member of the Denver U. S. Bureau of Mines Experiment Station, where he will continue his work on radium.

Dr. Walter Rytz has been elected curator of the collections of the Botanical Gardens at Berne.

Dr. Allen W. Freeman, of Richmond, Va., has resigned as assistant state health commissioner to become epidemiologist for the United States Public Health Service at Washington.

Governor Walsh, of Massachusetts, has appointed to the commission on terminal facilities in Boston, Professor C. M. Spofford, head of the department of civil and sanitary engineering at the Massachusetts Institute of Technology. Professor Spofford recently finished his work with the committee in Cambridge on a proper system of taxation for the city.

A position as research associate in pathology has been added to the department of pathology of the University of California for 1915–16 through the gift of Mr. James K. Moffitt, of San Francisco, a regent of the university. To this position will come Dr. H. T. Chickering, of the Rockefeller Institution for Medical Research. He will be associated with Professor F. P. Gay in investigations on the treatment of typhoid by the use of sensitized vaccine. This research associateship is in addition to a research associateship in pathology for which other donors a few weeks ago agreed to provide an annual gift of $1,200, and an eventual endowment of $25,000.

Dr. L. A. Bauer, director of the magnetic observatory of the Carnegie Institution at Washington, has presented to the Brown University Library a complete set, Volumes I. to XX., of the *Journal of Terrestrial Magnetism and Atmospheric Electricity,* founded and edited by him.

Mrs. Matilda Coxe Stevenson, for the last twenty-five years ethnologist in the Bureau of American Ethnology, died on June 24, at the age of sixty-five years.

The Vassar alumnæ of the early seventies have started a movement for the purpose of erecting a monument to the memory of Professor James Orton, who occupied the chair of natural history at the college from 1869 until his death in 1877. Professor Orton was born at Seneca Falls, New York, in 1830 and was educated at Williams College and Andover Theological Seminary. In 1866 he was appointed instructor in the natural sciences at Rochester University. In 1867 a scientific expedition to the Andes and the River Amazon was organized under the direction of the Smithsonian Institution and Professor Orton was placed in charge. On his return he accepted the chair of natural science in Vassar College, which he occupied until his death eight years later on his third expedition to equatorial America.

Frederick W. Spanutius died in Hastings-on-Hudson, on June 20, at the age of forty-seven years. He was instructor in chemistry in the Pennsylvania State College, Iowa State University and Lehigh University. Later he engaged in industrial work and owned works at Hastings called the Pan Chemical Company.

Mr. F. H. Neville, F.R.S., late lecturer on physics and chemistry in Sidney Sussex Col-

lege, Cambridge, died on June 5, in his sixty-eighth year.

PROFESSOR F. C. COOPER, for twenty years professor of chemistry in the University of St. John's, Shanghai, died on June 4, while on a furlough in England.

PROFESSOR PIETER ZEEMAN, of the University of Leiden, has died at the age of fifty years. His discovery of the effect of magnetism on the emission of spectral lines and other work in physics, have given him distinction. He received the Nobel Prize in 1902.

THE United States Civil Service Commission announces an examination on July 13 for associate chemist, for men only, to fill a vacancy in this position in the Bureau of Standards, Department of Commerce, Washington, D. C., at a salary ranging from $2,000 to $2,500 a year. It is desired to secure eligibles having a thorough scientific training and several years' experience in the investigation of problems involving the chemistry, physical chemistry and metallurgy of metals. Candidates should be able to initiate and carry on independent research in the preparation, analysis and properties of metals and alloys. Competitors will not be assembled for examination, but will be rated on education, experience and publications. Graduation, with a bachelor's degree in chemistry, from a full four-years' course at a college or university of recognized standing, and at least three years' subsequent research work in the chemistry of metals and alloys, are prerequisites for consideration for this position.

THE Bureau of Standards has completed the plans for its new chemical laboratory building, the cost not to exceed $200,000, for which appropriation was made by congress last winter. The architects, Donn and Deming, have drafted the specifications, which are about to go to press. It is expected that advertisements for proposals for the construction of this laboratory will be published during June. The laboratory will be situated on Pierce Mill Road near Connecticut Avenue, in the northwest suburbs of Washington, D. C., and will form the seventh of the group of special laboratory buildings erected for the bureau.

THE International Commission on the Teaching of Mathematics has issued, through the Bureau of Education at Washington, from which it can be obtained, a bulletin on the teaching of elementary and secondary mathematics in the leading countries of the world. This bulletin, prepared by J. C. Brown, sets forth the nature of the mathematics taught in every school year, from the first through the twelfth, in the standard type of school.

THE second annual conference of the Society for Practical Astronomy will convene August 16, 17 and 18, at the University of Chicago, Chicago, Ill. All persons interested in astronomy, and friends of the science, whether members of the society or not, are cordially invited to attend the regular sessions of the conference, and will be made welcome there. The program will consist of papers from members, illustrated lectures an astronomical subjects, and *conversazioni*. For at least two of the evenings excursions have been planned to the Dearborn Observatory of Northwestern University, in Evanston, Ill., and to the (private) Petrajtys Observatory, in South Chicago, Ill.

GOVERNOR HIRAM W. JOHNSON has declined to approve the anti-vivisection bill which was passed by the California legislature at its last session. The committee on medical instruction of the regents of the University of California, the deans of the California and Stanford medical schools, the biological and agricultural investigators, the medical profession, and many other citizens had protested against the measure as an unwarrantable interference with science. In declining to approve the bill Governor Johnson announced that its provision that any humane officer should be permitted to invade any scientific laboratory without a search warrant was an unconstitutional interference with personal liberty and the rights of privacy.

A PARAGRAPH in the latest number of *Astronomische Nachrichten*, No. 4,802, brings some encouragement as to the solidarity of science in contrast to the international animosities reported from Europe in the daily press. Pro-

fessor Albrecht begins his usual preliminary report on the international latitude service with the following words: "Although international undertakings in nearly all fields were subject to far reaching disturbances in 1914 from the circumstances of the war, the international latitude service happily suffered no interruption, and was carried out quite in the usual manner at all six stations. Furthermore, since there were no appreciable delays in sending in the observing books [to the central office at Potsdam], the preliminary derivation of the orbit of the pole could be undertaken in precisely the same maner as in previous years." It should perhaps be added that the six observing stations, on the parallel of latitude N. 39° 8′, are at Mizusawa, Japan; Tschardjui, Russia; Carloforte, Sardinia, and in the United States at Gaithersburg, Md.; Cincinnati and Ukiah, Cal.

The total production of explosives in the United States during the year 1914, exclusive of exports, according to figures compiled by Albert H. Fay, of the United States Bureau of Mines, was 450,251,489 pounds or 225,126 short tons, as compared with 500,015,845 pounds or 250,008 short tons for 1913. The production for 1914 is segregated as follows: black powder, 206,099,700 pounds; "high" explosives other than permissible explosives, 218,453,971 pounds; and permissible explosives 25,697,818 pounds. The figures represent a decrease of 23,839,831 pounds of black powder; 23,932,573 pounds of high explosives, and 1,987,952 pounds of permissible explosives, as compared with 1913. Mr. Fay says: "As explosives are essential to mining, and the use of improved types of explosives tends to lessen the dangers attending this industry, the Bureau of Mines undertook the compilation of information showing the total amount of explosives manufactured and used in the United States, its first report dealing with the year 1912. The report for 1914 is therefore the third technical paper issued by the bureau relating to the production and distribution of explosives. In the year 1902 only 11,300 pounds of permissible explosives were used in coal mining, whereas in 1913 the quantity so used was 21,804,285 pounds, as compared with 19,593,892 pounds in 1914. The quantity of permissible explosives used in the United States is larger than in a number of foreign countries. In 1912 it represented about 5 per cent. of the total quantity of explosives produced, and in 1914 5.7 per cent. The total amount of explosives used for the production of coal in 1914 was 220,622,487 pounds, of which about 8.9 per cent. was of the permissible class as compared with 9.5 per cent. in 1913.

The United States Coast and Geodetic Survey, Department of Commerce, has issued as Serial No. 3, Special Publication No. 25, a quarto pamphlet of 69 pages entitled "Results of Magnetic Observations made by the United States Coast and Geodetic Survey in 1914," by D. L. Hazard. This publication contains the results of magnetic observations made on land and at sea during the calendar year 1914, together with descriptions of the stations occupied. Results are given for 385 stations in 289 localities, including an investigation of areas of marked local disturbance in Iowa and Minnesota. There is presented in tabular form a comparison of the declination results at 76 repeat stations with the results of earlier observations in the same localities. The results have been corrected to reduce them to the provisional international standard of the Department of Terrestrial Magnetism of the Carnegie Institution of Washington. The stations described are located in thirty-three states and territories, including Arizona, Alabama, Alaska, Arkansas, California, Colorado, Delaware, Florida, Georgia, Idaho, Illinois, Iowa, Louisiana, Maine, Massachusetts, Minnesota, Mississippi, Montana, Nebraska, New Hampshire, New Jersey, New Mexico, New York, North Dakota, Oklahoma, Oregon, Pennsylvania, South Dakota, Tennessee, Texas, Vermont, Washington and Wisconsin. Besides the scientific value of these observations, this work is of practical utility to engineers and surveyors, and particularly to those interested in retracing old property lines. In the early days and even more recently these lines were run with the compass almost exclusively and to rerun them a knowledge of the variation of the

compass at the date of survey is essential. The volume will be supplied without charge to persons interested by application to the Division of Publications, Department of Commerce.

THE United States Coast and Geodetic Survey, of the Department of Commerce, has recently published a report, called Special Publication No. 24, which contains among other data the exact latitudes and longitudes of about six hundred stations in Alabama and Mississippi. There are also given the correct distances between each two adjacent stations and the true bearings of the lines connecting them. Some of the stations are natural or artificial objects such as mountain peaks, church spires and lighthouses but many stations required special marks or monuments to preserve them. These are frequently metal tablets set into solid rock or blocks of concrete. Complete descriptions of these marks and of the general locations of the stations with reference to other objects and to the features of the surrounding country are contained in the publication. Engineers and surveyors interested in any of the stations can easily find them from these descriptions. The publication also contains the elevations of those stations which are on high ground. The point of greatest elevation in Alabama, determined by the Coast and Geodetic Survey, and probably the highest point in that state is station Cheehahaw, on the top of the mountains of the same name, which is 2,413 feet above sea level. This mountain is about nine miles south of the town of Oxford and its top is a point of the boundary line between Talledega and Clay counties. The Coast and Geodetic Survey is publishing its geodetic data for all states as rapidly as possible. Good progress has been made along this line and much valuable information is contained in the records which are now available for free distribution. Copies of the above-mentioned publication, Special Publication No. 24, may be obtained by interested parties upon application to the Division of Publications, Department of Commerce, Washington, D. C.

THE total production of Portland cement in the United States in 1914, according to Ernest F. Burchard, of the United States Geological Survey, was 88,230,170 barrels, valued at $81,789,368; the production for 1913 was 92,097,131 barrels, valued at $92,557,617. The output for 1914 represents a decrease in quantity of 3,866,961 barrels, and a decrease in value of $10,768,249. The value assigned to the production is computed on the basis of 92.7 cents a barrel, or the average value of the Portland cement shipped in 1914. The shipments of Portland cement from the mills in the United States in 1914 amounted to 86,437,956 barrels, valued at $80,118,475, compared with 88,689,377 barrels, valued at $89,106,975, shipped in 1913. This represents a decrease in quantity of 2,251,421 barrels, and in value of $8,988,500. The average factory price per barrel in bulk for the whole country in 1914 was 92.7 cents, compared with $1.005 in 1913, a decrease of 7.8 cents a barrel. This price is about 11.8 cents higher than the average price in the Lehigh district and is near the average price in New York, Illinois, Iowa, the southeastern states and the plains states, but falls 42.5 cents below the average price received in Utah, where Portland cement brought the highest figure during the year. Among the states there were unimportant changes in rank as cement producers. Pennsylvania and Indiana held first and second places respectively, as for many years, but both of these large cement-producing states suffered an appreciable reduction of output. In 1913 the output of California exceeded that of New York and Illinois, but in 1914 this state dropped from third to fifth place. New Jersey dropped from seventh to ninth place, having been passed by both Michigan and Iowa in 1914.

IN an address before the Society of Sigma Xi, Northwestern University, February 18, 1915, Joseph E. Pogue, associate professor of geology, discussed the relation between the geology, history and ethnology of turquois. Turquois has played an important rôle among many peoples of the globe. From the dawn of civilization down to the present it has found

a variety of uses, both ornamental and religious, and always held in high esteem it has come to be invested with many interesting superstitions and woven into numerous legends. The tombs of the earliest Egyptian kings have yielded jewelry of considerable beauty wrought of gold and inlaid with turquoises from the Sinai Peninsula. The inhabitants of China, Tibet and northern India have long valued the turquois and been lavish in its use, while the Persians and neighboring races of western Asia have from time immemorial drawn upon the famous Nishapur deposits near the Caspian Sea which furnished stones of the choicest character. The Europeans during the middle ages and thereafter esteemed the Persian stones that came to them by way of Turkey, and the mineral was known in Europe even prior to the Christian era. The Aztecs of old Mexico, at the time of the Spanish conquest under Cortés, employed turquois and "chalchihuitl," an allied or similar stone of greenish hue, in many of their ceremonies, and a number of remarkable turquois mosaics carried by the conquerors to Europe attest the skill and taste of these early Indian artisans. The Spaniards, on first penetrating the region now occupied by New Mexico and Arizona, lured on by reports of fabulous riches, found the turquois there too held in high regard, and recent excavations in the ancient pueblos and cliff-dwellings of these two states have revealed a wealth of turquois ornaments that reflect considerable credit on the artistic ability of their makers. By virtue of its parallel use in parts of the Orient and America, and its curious introduction into the lore of diverse and widely separated peoples, the turquois therefore carries considerable ethnologic interest. The wide use of turquois can be attributed to four factors: Its characteristic occurrence in desert regions, due to peculiar geologic conditions there obtaining, in positions of significant contact with early trade routes and lines of important migrations; its presence at or near the surface in such occurrences, expediting its discovery by primitive man; its comparative softness, enabling it to be easily worked with the crudest tools; and its distinctive color-range from the blue of the sky to the green of water and plants, making a strong psychological appeal to uncivilized peoples, peculiarly fitting their religious ideas, and constantly suggesting symbolical application.

THE quarrying of slate is an important mineral industry closely connected with the building trades. The value of slate produced in the United States in 1914, including slate sold in squares for roofing and as slabs for milling and other uses, was $5,706,787, according to A. T. Coons, of the United States Geological Survey, in the chapter on slate from the report "Mineral Resources, 1914." This was a decrease of over 7 per cent. from the value of $6,175,476 for the output of 1913. In 1914 the slate operators in general reported the demand for this material as good up to October, when the trade dropped off from 25 to 50 per cent. For the last twelve years the value of the slate output has remained practically stationary, fluctuating slightly with changes in trade and financial conditions. As compared with the output in 1905, ten years ago, which was valued at $5,496,207, the output in 1914 shows an increase in value of only $210,580, or nearly 4 per cent. The largest output ever reported was in 1908, when the value of $6,316,817 was nearly 10 per cent. greater than that of 1914. The average price per square of roofing slate in 1914 was the highest ever recorded—$4.08. This represents an advance of 39 cents in ten years. Pennsylvania, Vermont, Maine, Virginia, New York, Maryland, New Jersey and Utah, named according to rank of output, were the states producing slate in 1914. Pennsylvania produced over 63 per cent. of the total output and Vermont about 25 per cent. Nearly 73 per cent. of the value of the slate produced represented roofing slate, which is sold in "squares," each square containing a sufficient number of pieces of slate to cover 100 square feet on the roof. The output of roofing slate in 1914 was 1,019,553 squares, valued at $4,160,832, the average price being $4.08 per square. Pennsylvania's output represents about 59 per cent. and Vermont's 29 per cent. of the value of the

roofing-slate production of the United States. Virginia was the only state whose output showed an increase. Milling slate, including slate used for blackboards, school slates, electrical work, table tops, and sanitary and other structural work, decreased from $1,714,414 in 1913 to $$1,545,955 in 1914. There was an increase in the material sold for blackboards and a decrease in school slates and other mill stock.

THE United States Geological Survey has just issued, as Water-supply paper 358, a report on the water resources of the Rio Grande basin from 1888 to 1913, by Robert Follansbee and H. J. Dean. Systematic study of run-off in the Rio Grande basin was begun by the federal government near Embudo, New Mexico, soon after the passage of the act of October 2, 1888, which authorized the organization of the irrigation survey under the direction of the United States Geological Survey. A camp of instruction for hydrographers was established near Embudo, and at this camp and the gaging station near by the methods of stream measurements now in general use were systematized. In the spring of 1889 additional stations were established on the Rio Grande near Del Norte, Colo., and El Paso, Texas. From this beginning the work of measuring the waters of the Rio Grande basin has been expanded not only by the Geological Survey acting alone, but by the survey in cooperation with the American section of the International Water Commission and the state engineers of Colorado and New Mexico. At the end of September, 1913, records had been obtained at 93 gaging stations. The report contains not only all data concerning stream flow in the Rio Grande basin collected by the survey and cooperating parties but also records furnished by individuals connected with private interests. Since 1909 the state engineer of Colorado has cooperated in the maintenance of the stations in Colorado. From 1907 to 1912 the work in New Mexico was carried on under the immediate supervision of the territorial engineer. During the latter part of 1912 a cooperative agreement was made with the state engineer.

UNIVERSITY AND EDUCATIONAL NEWS

MR. JAMES J. HILL has given $125,000 to Harvard University to endow a professorship of transportation in the Graduate School of Business Administration.

A TRUST fund of $100,000, the proceeds of which are to be divided between the William Pepper Clinical Laboratory of Medicine and the Latin and Greek department, is bequeathed to the University of Pennsylvania under the will of Samuel Dickson, of Philadelphia.

THE Hahnemann Medical College of San Francisco has offered to convey all its property to the University of California, and has proposed to cease separate instruction. Instead two professorships are to be maintained in the University of California Medical School in homeopathic materia medica and in homeopathic therapeutics, the financial provision therefore to be made, for the next two years, by the homeopaths. The instruction in homeopathic materia medica and homeopathic therapeutics will be offered as elective courses. In all other respects students wishing eventually to become homeopathic practitioners will receive exactly the same instruction in the University of California Medical School as all of its other students.

DR. FRANK THILLY, professor of philosophy, has been elected dean of the College of Arts and Sciences, Cornell University, for a term of two years. He was nominated by the faculty and was elected by the trustees at the board's meeting on June 15. He succeeds Professor E. L. Nichols, whose term has expired and who will spend next year in the far east.

DR. BAILEY WILLIS, of the U. S. Geological Survey, Washington, D. C., has been appointed head professor of geology in the Leland Stanford Junior University, filling the vacancy left in this department when Dr. John C. Branner became president of the university. Professor Willis will take up his new duties with the opening of the school year in September.

DR. W. F. R. PHILLIPS, of the University of Alabama, has accepted the chair of anatomy in the Medical College of South Carolina.